91. (Unchanged From Prior Version) A computer program product as claimed in claim 63, wherein the computer program product comprises a plurality of techniques for generating the second vectors and means for selecting one of the techniques in response to user input.

REMARKS

This application has been carefully reviewed in light of the Office Action dated July 16, 2002 (Paper No. 12). Claims 1 to 29, 32 to 60 and 63 to 91 are in the application, with Claims 1, 32 and 63 being the independent claims. Reconsideration and further examination are respectfully requested.

Initially, Applicants thank the Examiner for the indication that Claims 4 to 29, 35 to 60 and 66 to 91 contain allowable subject matter and would be allowable if rewritten in independent form. Applicants have not rewritten these claims in independent form, however, since it is believed that all claims currently in the application are in condition for allowance, as discussed in more detail below.

Claims 1 to 3, 32 to 34 and 63 to 65 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 6,268,871 (Rice). Applicants have carefully considered the Examiner's comments and the applied reference and respectfully traverse the rejection for the following reasons.

The present invention concerns the orientation of a space curve having one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a reverse direction proceeding along the space

curve from the terminating endpoint to the initial endpoint. The space curve is orientated in accordance with a direction determined by comparing a first vector that has a selected desired direction and a second vector that has a direction indicative of a corresponding characteristic of the space curve, where the determined direction is the direction along the space curve from a first endpoint to a second endpoint that is closest to the selected desired direction.

With reference to particular claim language, independent Claims 1, 32 and 63 concern orientating a space curve, where the space curve has two endpoints. A desired direction is selected and a first vector having a direction which is the same as the selected desired direction is generated. At least one second vector is generated, where each second vector has a corresponding direction indicative of a corresponding characteristic of the space curve. The first and second vectors are compared so as to determine a direction of the space curve. The space curve has one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a reverse direction proceeding along the space curve from the terminating endpoint to the initial endpoint. The determined direction of the space curve is a direction along the space curve from a first endpoint to a second endpoint that is closest in direction to the selected desired direction. The direction of the space curve is then orientated in accordance with the determined direction.

The applied reference is not understood to disclose or suggest the foregoing features of the present invention. In particular, Rice is not understood to disclose or suggest at least the features of comparing a first vector having a direction the same as a

selected desired direction and a second vector having a direction indicative of a corresponding characteristic of a space curve to determine a direction of the space curve that is closest in direction to the selected desired direction, and orientating the space curve in accordance with the determined direction, where the space curve has one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a reverse direction proceeding along the space curve from the terminating endpoint to the initial endpoint.

Rice concerns a method for generating a blended curve using constraint points. The constraint points define intersection points for the blended curve and have user-specified geometric continuity conditions of various degrees. However, Rice is not understood to disclose or suggest that the generated blended curve has a direction, let alone a forward or reverse direction. The Office Action refers to column 5, lines 35 to 38, and Figure 6 of Rice for disclosure of the generated blended curve having either a forward direction or a reverse direction. This portion of Rice is understood to merely describe different degrees of geometric continuity set at particular constraint points together with a specified direction vector, but is not understood to even mention the resulting blended curve having either a forward or a reverse direction. While Rice is understood to describe the blended curve passing through a constraint point parallel to a specified direction vector, the resulting blended curve is not understood to have a particular direction. Therefore, Rice is not understood to disclose or suggest a curve having either a forward or a reverse direction.

Since Rice is not understood to disclose or suggest the blended curve having either a forward or a reverse direction, Rice is also not understood disclose or suggest comparing a first vector having a direction the same as a selected direction and a second vector having a direction indicative of a corresponding characteristic of the curve to determine a direction of the curve because the curve is not understood to have a particular direction. The Office Action contends that it would have been obvious to compare a first and a second vector to determine a direction of the curve in Rice since Rice teaches implementing geometric continuity conditions to ensure the location of the blended curve with that of an underlying geometry, as described in column 4 beginning at line 21 of Rice. However, this portion of Rice is understood merely to disclose the creation of specified direction vectors at constraint points and the generation of a blended curve that runs parallel to the direction vectors at the respective constraint points, and is not understood to disclose or even suggest comparing a first and a second vector to determine a direction of the blended curve.

Therefore, Rice is not understood to disclose or suggest at least the features of comparing a first vector having a direction the same as a selected desired direction and a second vector having a direction indicative of a corresponding characteristic of a space curve to determine a direction of the space curve that is closest in direction to the selected desired direction, and orientating the space curve in accordance with the determined direction, where the space curve has one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a

reverse direction proceeding along the space curve from the terminating endpoint to the initial endpoint.

Accordingly, independent Claims 1, 32 and 63 are believed to be allowable over Rice. Reconsideration and withdrawal of the § 103(a) rejection of Claims 1, 32 and 63 are respectfully requested.

The other rejected claims are dependent from the independent claims discussed above and are therefore believed to be allowable over the applied reference for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

In view of the foregoing remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicants' undersigned attorney may be reached in our Costa Mesa, California, office by telephone at (714) 540-8700. All correspondence should be directed to our address given below.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

4. (Twice Amended) A method as claimed in claim 3, wherein said step of comparing [step] the first and second vectors comprises the sub-steps of:

determining a first angle between one of the second vectors and the first vector;

determining a second angle between the other one of the second vectors and the first vector; and

comparing the first angle with the second angle,

wherein if the first angle is less than the second angle then the determined direction of the space curve is in a first direction, and if the first angle is greater than the second angle then the determined direction of the space curve is in a second direction, opposite the first direction.

5. (Twice Amended) A method as claimed in claim 2, wherein said step of comparing [step] the first and second vectors comprises the sub-steps of:

determining a first angle between the first vector and the second vector; and

comparing the first angle with a first threshold value,

wherein if the first angle is less than the first threshold value then the determined direction of the space curve is in a first direction, and if the first angle is greater

than the first threshold value then the determined direction of the space curve is in a second direction, opposite the first direction.

11. (Twice Amended) A method as claimed in claim 7, wherein, if the first angle equals the second angle, said step of comparing [step] the first and second vectors further comprises the sub-steps of:

determining a third angle between one of the second vectors and the orthogonal vector;

determining a fourth angle between the other one of the second vectors and the orthogonal vector; and

comparing the third angle with the fourth angle,

wherein if the third angle is less than the fourth angle then the determined direction of the space curve is in a third direction, and if the third angle is greater than the fourth angle then the determined direction of the space curve is in a fourth direction, opposite the third direction.

12. (Twice Amended) A method as claimed in claim 8, wherein if the first angle equals the first threshold value, said step of comparing [step] the first and second vectors further comprises the sub-steps of:

determining a second angle between the second vector and the orthogonal vector; and

comparing the second angle with a second threshold value,

wherein if the second angle is less than the second threshold value then the determined direction of the space curve is in a third direction, and if the second angle is greater than the second threshold value then the determined direction of the space curve is in a fourth direction, opposite the third direction.

14. (Twice Amended) A method as claimed in claim 1, wherein said step of generating at least one second vector comprises the substeps of:

determining endpoints of the space curve; and

generating, at each endpoint, a second vector tangent to the space curve.

15. (Twice Amended) A method as claimed in claim 14, wherein said step of comparing [step] the first and second vectors comprises the sub-steps of:

determining a first angle between one of the second vectors and the first vector;

determining a second angle between the other one of the second vectors and the first vector; and

comparing the first angle with the second angle,

wherein if the first angle is less than the second angle then the determined direction of the space curve is in a first direction, and if the first angle is greater than the second angle then the determined direction of the space curve is in a second direction, opposite the first direction.

18. (Twice Amended) A method as claimed in claim 17, wherein said step of comparing [step] the first and second vectors further comprises the sub-steps of:

determining a third angle between one of the third vectors and the first vector;

determining a fourth angle between the other one of the third vectors and the first vector; and

comparing the third angle with the fourth angle,

wherein if the third angle is less than the fourth angle then the determined direction of the space curve is in a third direction, and if the third angle is greater than the fourth angle then the determined direction of the space curve is in a fourth direction, opposite the third direction.

19. (Twice Amended) A method as claimed in claim 16, wherein said step of comparing [step] the first and second vectors comprises the sub-steps of:

determining a third angle between the third vector and the first vector; and

comparing the third angle with a first threshold value,

wherein if the third angle is less than the first threshold value then the determined direction of the space curve is in a third direction, and if the third angle is greater than the first threshold value then the determined direction of the space curve is in a fourth direction, opposite the third direction.

25. (Twice Amended) A method as claimed in claim 21, wherein if the third angle equals the fourth angle, said step of comparing [step] the first and second vectors further comprises the sub-steps of:

determining a fifth angle between the first one of the third vectors and the orthogonal vector;

determining a sixth angle between the other one of the third vectors and the orthogonal vector; and

comparing the fifth angle with the sixth angle,

wherein if the fifth angle is less than the sixth angle then the determined direction of the space curve is in a fifth direction, and if the fifth angle is greater than the sixth angle then the determined direction of the space curve is in a sixth direction, opposite the fifth direction.

26. (Twice Amended) A method as claimed in claim 22, wherein if the third angle equals the first threshold value, said step of comparing [step] the first and second vectors comprises the sub-steps of:

determining a fourth angle between the third vector and the orthogonal vector; and

comparing the fourth angle with a second threshold value,

wherein if the fourth angle is less than the second threshold value then the determined direction of the space curve is in a fourth direction, and if the fourth angle is

greater than the second threshold value then the determined direction of the space curve is in a fifth direction, opposite the fourth direction.

28. (Twice Amended) A method as claimed in claim 1, wherein the method comprises the step of providing further space curves and performing said step of generating at least one second vector, said step of comparing the first and second vectors, and said [comparing] step of orientating the direction of the space curve on each space curve.

32. (Twice Amended) An apparatus for orientating a space curve, wherein the space curve has two endpoints, the apparatus comprising:

selection means for selecting a desired direction;

first generation means for generating a first vector having a direction which is the same as the selected desired direction;

means for providing the space curve;

second generation means for generating at least one second vector, each second vector having a corresponding direction indicative of a corresponding characteristic of the space curve;

[comparing] first comparison means for comparing the first and second vectors so as to determine a direction of the space curve, wherein the space curve has one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a reverse direction proceeding along the space curve from the terminating endpoint to the initial endpoint, and wherein the determined

direction of the space curve is a direction along the space curve from a first endpoint to a second endpoint that is closest in direction to the selected desired direction; and

orientation means for orientating the direction of the space curve in accordance with the determined direction.

57. (Twice Amended) An apparatus as claimed in claim 53, wherein the first comparison means further comprises [the following]:

means for determining a fourth angle between the third vector and the orthogonal vector; and

means for comparing the fourth angle with a second threshold value,

wherein if the fourth angle is less than the second threshold value then the determined direction of the space curve is in a fourth direction, and if the fourth angle is greater than the second threshold value then the determined direction of the space curve is in a fifth direction, opposite the fourth direction.

63. (Twice Amended) A computer program product comprising a computer readable medium having a computer program for orientating a space curve, wherein the space curve has two endpoints, the computer program product comprising:

selection means for selecting a desired direction;

first generation means for generating a first vector having a direction which is the same as the selected desired direction;

means for providing [a] the space curve;

second generation means for generating at least one second vector, each second vector having a corresponding direction indicative of a corresponding characteristic of the space curve;

first comparison means for comparing the first and second vectors so as to determine a direction of the space curve, wherein the space curve has one of two directions, either a forward direction proceeding along the space curve from an initial endpoint to a terminating endpoint or a reverse direction proceeding along the space curve from the terminating endpoint to the initial endpoint, and wherein the determined direction of the space curve is a direction along the space curve from a first endpoint to a second endpoint that is closest in direction to the selected desired direction; and

orientation means for orientating the direction of the space curve in accordance with the determined direction.